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Disposable diapers

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Disposable diaper for use as infant-type diaper or pants - has bond line
for holding front and back together and cutting lines allowing front to
be torn off

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A disposable diaper generally comprising longitudinally continuous front and rear bodies and a pair of fastening flaps extending from laterally opposite side portions of a waist zone of the front or rear body. The longitudinally continuous front and rear bodies are folded so that laterally opposite side portions of the front body are accurately laid upon those of the rear body. The fastening flaps have fastening spots on respective surfaces which face towards the front body when laid there-over and which are adjacent respective distal ends of the flaps and respective base ends laid upon the laterally opposite side portions of the waist zone of the front body. Each side of the diaper a side portion of the waist zone of the front body is bonded to a side portion of the waist zone of the rear body and one the base end of a respective fastening flap along a bond line. Cutting lines are provided laterally inwardly and adjacent the respective bond lines so that the front body may be torn off along these cutting lines from the rear body, and each of the bond lines has a resistance of 1000 g/inch or high to separation occurring between the front and rear bodies. (Dwg. No. 1)

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FIG.1

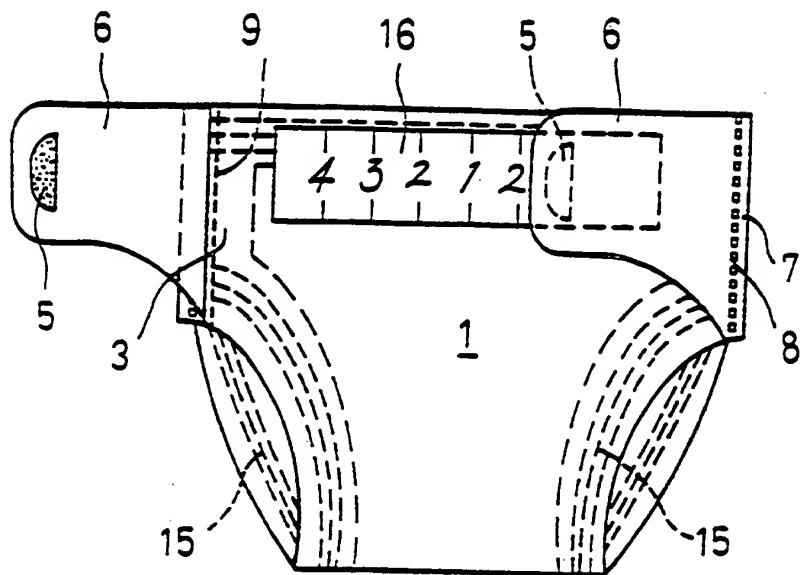


FIG.2

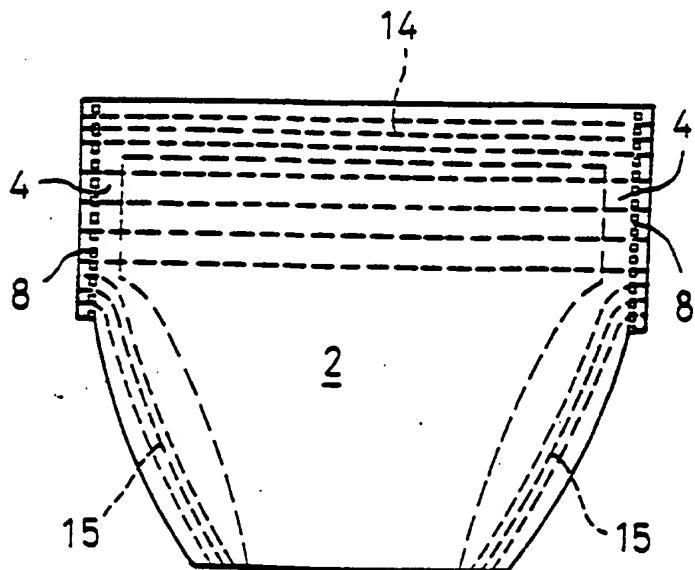


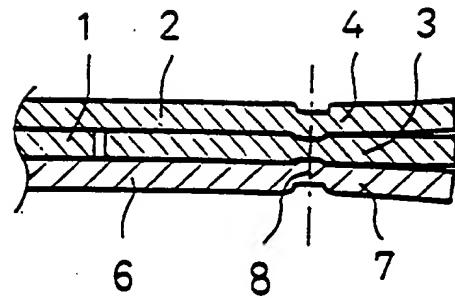
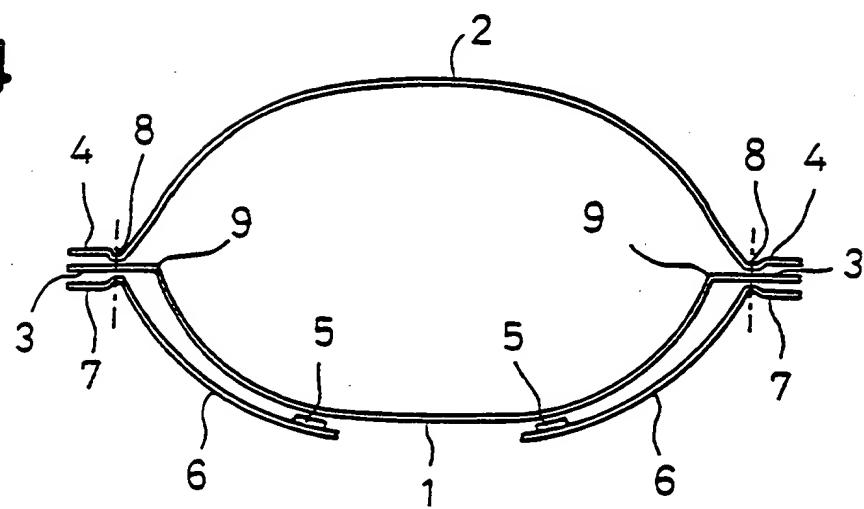
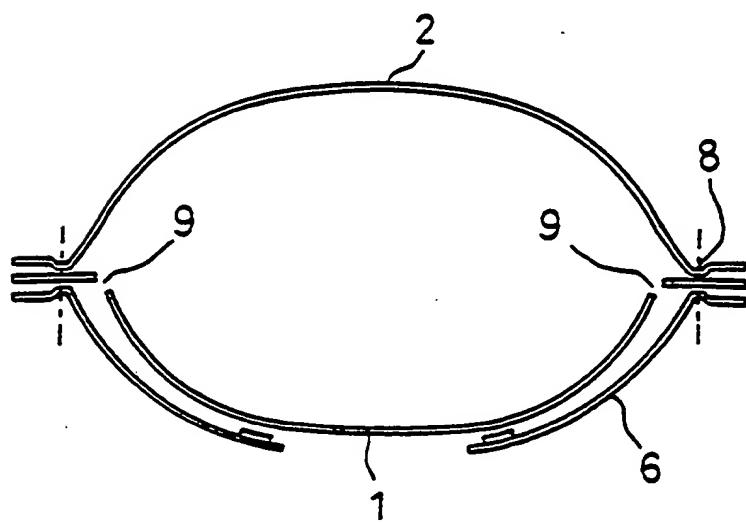
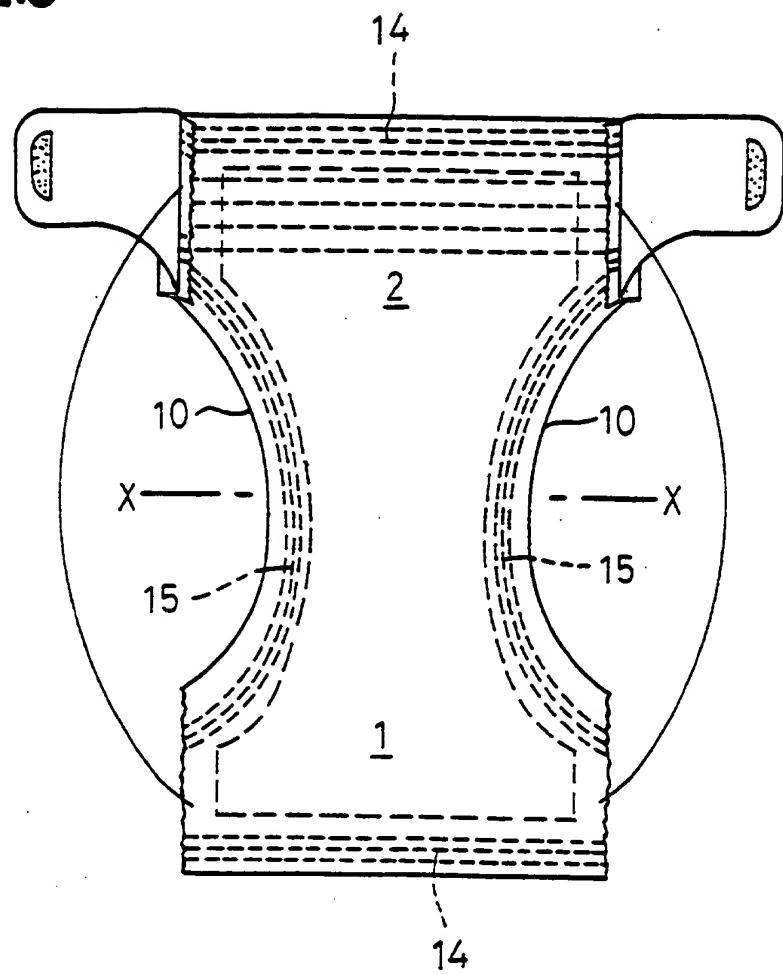
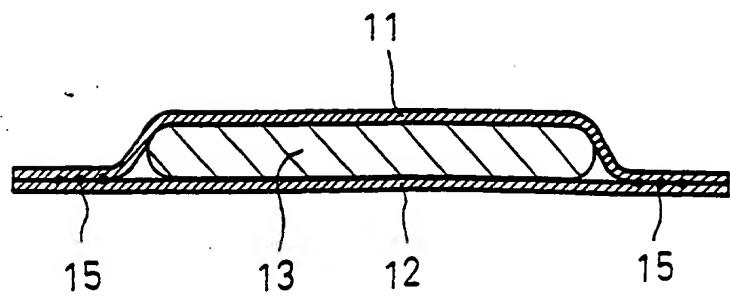
FIG.3**FIG.4****FIG.5**

FIG.6**FIG.7**

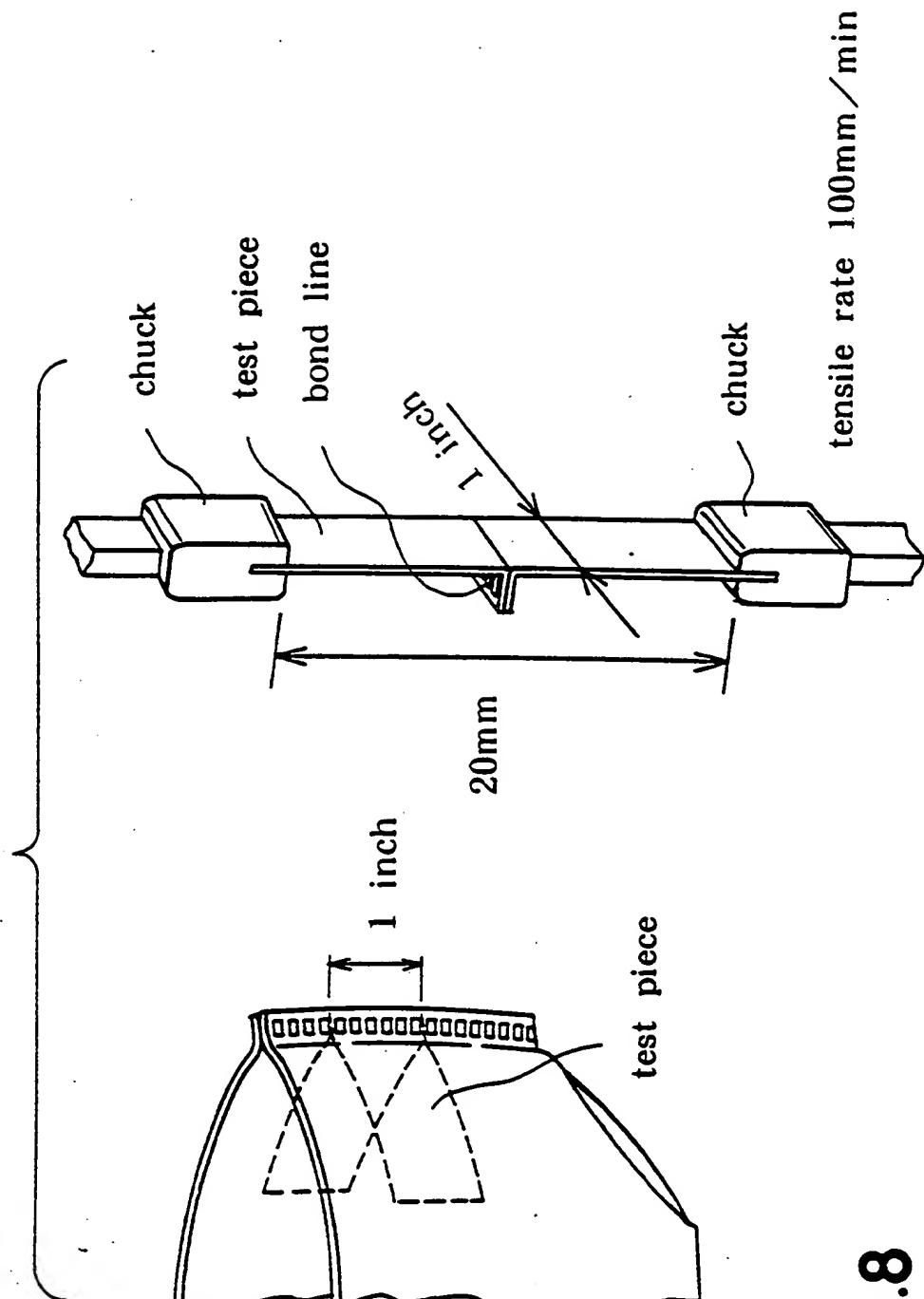


FIG.8

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DISPOSABLE DIAPERS

This invention generally relates to a disposable diaper and, more particularly, to such a diaper adapted to be selectively usable either as so-called pants type diaper having front and rear bodies which are connected together during a step of manufacturing so as to form a closed loop for extending around the waist or a so-called open type diaper having front and rear bodies to be connected together so as to form a closed loop around the waist by means of fastening flaps only when the diaper is actually put on a wearer.

Japanese Utility Model Application Disclosure Gazette No. 1992-5826 discloses a disposable diaper comprising front and rear bodies which have been previously bonded together along one of the waist zone's laterally opposite side portions but can be releasably bonded together by a tape-like fastener along the other side portion. On the other hand, Japanese Patent Application Disclosure Gazette No. 1992-89050 discloses a disposable diaper comprising front and rear bodies adapted to be releasably bonded together by adhesive tape along at least one of the waist zone's laterally opposite side portions.

The diaper disclosed in the above-identified Japanese

Utility Model Application Disclosure Gazette No. 1992-5826 is inconvenient to put on a wearer irrespective of whether the wearer is in a standing posture or lying posture, because one of said laterally opposite side portions is permanently closed. The diaper disclosed in the above-identified Japanese Patent Application Disclosure Gazette No. 1992-89050 is disadvantageous in that, when the waist-opening is widened in order to put the diaper on a wearer as it is usually done for normal pants having the waist line closed in a loop, one or both of the waist zone's laterally opposite side portions previously closed as in the case of said normal pants can be unintentionally opened, and the expected effect of previously closing the waist line can be decreased to half, because such closure is made merely by adhesive tape (in the course of manufacturing).

Accordingly, it is a principal object of the invention to provide an improved disposable diaper having front and rear bodies which have been previously bonded together along the waist zone's laterally opposite side portions in the course of manufacturing but, if desired, can be separated from each other and bonded together again so that the opposite side portions thus re-bonded together can never be unintentionally opened even if the waist-opening is widened in order to put the diaper on a wearer.

The object set forth above is achieved, in accordance with the invention, by a disposable diaper generally comprising longitudinally continuous front and rear bodies and a pair of fastening flaps extending from laterally opposite side portions of a waist zone of said front or rear body, wherein said longitudinally continuous front and rear bodies are folded so that laterally opposite side portions of said front body are accurately laid upon those of said rear body, said fastening flaps have fastening spots on respective surfaces which face towards said front body when laid thereover and which are adjacent respective distal ends of said flaps and respective base ends laid upon the laterally opposite side portions of the waist zone of said front body, at each side of said diaper a side portion of said waist zone of said front body is bonded to a side portion of said waist zone of said rear body and one said base end of a respective fastening flap along a bond line, cutting lines are provided laterally inwardly and adjacent said respective bond lines so that said front body may be torn off along these cutting lines from said rear body, and each of said bond lines has a resistance of 1000 g/inch or higher to separation occurring between said front and rear bodies.

Preferably, said bond lines are formed by welding and said cutting lines are formed by intermittent cuts or perforations.

The invention will be described in more detail by way of example with reference to the accompanying drawings, in which:

Fig. 1 is a front view of a diaper erected with one of the fastening flaps being fastened to a front body;

Fig. 2 is a rear view of the diaper completely made;

Fig. 3 is a fragmentary sectional view showing, in an enlarged scale, a line along which the front body, the rear body and the fastening flaps are bonded together in the proximities of their laterally opposite side edges and base ends, respectively;

Fig. 4 is an upper end view of the made diaper;

Fig. 5 is a view similar to Fig. 4 but showing the made diaper with laterally opposite side portions of the front body being cut apart from those of the rear body;

Fig. 6 is a plan view showing the inner side of the unfolded diaper;

Fig. 7 is an enlarged sectional view taken along a line X-X in Fig. 6; and

Fig. 8 is a perspective view illustrating a measuring method for separation-resistance of the bond line conducted using a test piece.

Referring to Figs. 1 to 5, front and rear bodies 1, 2 of a diaper are longitudinally continuous. The front and rear bodies 1, 2 is folded back one on the other with laterally opposite side portions 3, 3 of the front body 1 at the level of the waistzone being accurately laid upon the corresponding opposite side portions 4, 4 of the rear body 2. Then a pair of fastening flaps 6 carrying on inner surfaces adjacent front ends thereof fastening spots 5 serving as fastening means are laid at base ends 7 thereof upon said laterally opposite side portions 3, 3 and 4, 4 of the front and rear bodies 1, 2 which have already been laid one upon the other. These components 1, 2, 6 thus laid one upon another are intermittently bonded together under effect of heat or supersonic waves along lines 8 extending parallel to and adjacent said side portions 3, 4 as well as said base ends 7 so as to leave respective outer edges of these components not bonded. The front body 1 is provided at locations 9 adjacent the respective bond lines 8 with cutting lines 9 extending parallel to the respective bond lines 8 in the form of intermittent cuts or holes (i.e., so-called perforations) so that the front body 1 can be torn off along these cutting lines 9 from the rear body 2.

Bonding strength (or separation-resistance) of each bond

line 8 along which the front and rear bodies 1, 2 have been bonded together is 1000 g/inch or higher so that the laterally opposite side portions 3, 3, and 4, 4 of the respective bodies 1, 2 bonded together along said bond lines 8 may be reliably prevented from being separated from each other, even if each bond line 8 is subjected to a tearing force possibly tending to separate off said laterally opposite side portions 3, 3 and 4, 4 from each other, for example, when it is desired to widen the waist-opening formed by bonding the laterally opposite side portions 3, 3 and 4, 4 at the level of waist zone of the front and rear bodies 1, 2 in the manner as has previously been mentioned in order to put the diaper on a wearer, or when the front body 1 is pulled, with the diaper put on a wearer, to cut the front body 1 off from the rear body 2 along each cutting line 9. It should be understood that the separation-resistance is measured using a test piece including a partial length of the bond line 8, which was sampled from the diaper by cutting off a portion surrounded by broken lines in Fig. 8. As shown, the test piece is a rectangular strip having a width of 1 inch and longitudinally extending from the bond line 8 over a length larger than 10 mm in opposite directions, respectively. The test piece is held at longitudinally opposite ends thereof by a pair of chucks, respectively, so that

initially the test piece linearly extends between said pair of chucks accurately over a distance of 20 mm with the bond line 8 lying in the middle. Then, the test piece is longitudinally tensioned at a rate of 100 mm/min and thereby a value (g) at a moment of separation occurring along the bond line 8 is determined as the separation-resistance value.

Referring to Figs. 1, 2 and 6, each blank of the diaper comprising longitudinally continuous front and rear bodies 1, 2 is then formed with laterally opposite concave edges 10 extending between the respective waist zones of the front and rear bodies 1, 2 so as to define respective leg-openings. This blank is composed, as best seen in Fig. 7, of a liquid-permeable topsheet 11, a liquid-impermeable backsheets 12 and an hourglass-shaped liquid-absorbent panel 13 sandwiched between said top- and backsheets 11, 12. The blank is further provided along the respective waist zones of the front and rear bodies 1, 2, as well as along the above-mentioned concave edges 10 destined to form the respective leg-openings, with a plurality of parallel extending thread-like elastic members 14, 15, respectively, which are attached under their longitudinally stretched condition between the top- and backsheets 11, 12 utilizing hot melt type adhesive. The elastic members 14 associated with the waist zone of the rear body 2 are arranged to

occupy substantially all of this zone parallel to one another with their spacings increasing from the outermost edge toward the inside of the waist zone so that a total elasticity of these elastic members 14 is higher than that of the elastic members 14 associated with the waist zone of the front body 1. It should be understood that, though not shown, the waist zone of the rear body 2 may be partially made from pieces of elastic fabric without providing both front and rear bodies 1, 2 with the respective elastic members 14 as in the illustrated embodiment. For example, such pieces of elastic fabric may be connected to the waist zone of the rear body 2 at laterally opposite side edges thereof by means of welding or the like. While not shown, it is also possible to form the fastening flaps 6 wholly or partially from elastic material without departure from the scope of the invention.

The waist zone of the front body 1 has a scaled narrow sheet 16 stuck on an outer surface thereof in order to protect this surface which otherwise would be directly and repeatedly engaged by the fastening spots 5 of the respective fastening flaps 6. The scaled narrow sheet 16 functions also as an indicator adapted to conveniently indicate locations at which the respective fastening spots 5 are laid upon said outer surface. The fastening spots 5 may be formed by application of the adhesive conventionally

used for such purpose or may be a piece of tape having thereon a plurality of hooks such as Velcro (trademark) or Magic Tape (trademark) both of which are well known to those skilled in the art. To use such piece of tape as the fastening spot 5, the scaled narrow sheet 16 must have a piled surface with which the hooks of the fastening spot 5 are effectively engageable.

The fastening flap 6 may be made from nonwoven fabric or laminate sheet consisting of such nonwoven fabric and plastic film or paper of fine quality. The topsheet 11 may be made of nonwoven fabric or porous plastic film. The backsheet 12 may be made of plastic film or laminate sheet consisting of such plastic film and nonwoven fabric. The scaled narrow sheet 16 may be made of plastic film or nonwoven fabric or felt, depending on the desired nature of the fastening spot 5.

The diaper constructed according to the teachings of this invention as has been described hereinabove can be put on a wearer as a pants type diaper, i.e., in its original configuration, for example, when it is desired to put the diaper on a wearer who is in a standing posture. While the fastening flaps 6 are principally unnecessary in this case, it is preferred that the fastening spots 5 are firmly engaged with the narrow sheet 16 at appropriate locations thereof to avoid undesirable movement of the diaper with

respect to a wearer's body during use of the diaper (Fig. 4). When it is desired to put the diaper on a wearer who is in a lying posture, the laterally opposite side portions of the front body 1 are torn off from those of the rear body 2 along the cutting lines 9 by pulling the front body 1 or the fastening flaps 6 so as to obtain the diaper of open type (Fig. 6) and, after having put it on a wearer, the fastening flaps 6 are folded inward onto the narrow sheet 16 so that the respective fastening spots 5 may be firmly engaged with said sheet 16 at desired locations thereof (Fig. 5).

The invention allows the diaper to be put on a wearer selectively either as the pants type diaper or as the open type diaper. The diaper of this invention is advantageous particularly in that, even if the bond lines extending along the laterally opposite side portions are subjected to a tearing force usually exerted thereon when the diaper is used as the pants type diaper, no separation occurs along the laterally opposite side portions of the front and rear bodies, because each of the bond lines has a separation-resistance as high as 1000 g/inch or higher.

After solid excretion has been discharged on the diaper, the front body may torn off from the rear body along the cutting lines provided along the laterally opposite side portions and thereby the diaper may be easily

removed from a wearer without undesirably smearing the wearer's skin with solid excretion.

CLAIMS:

1. A disposable diaper generally comprising longitudinally continuous front and rear bodies and a pair of fastening flaps extending from laterally opposite side portions of a waist zone of said front or rear body, wherein:

said longitudinally continuous front and rear bodies are folded so that laterally opposite side portions of said front body are accurately laid upon those of said rear body;

said fastening flaps have fastening spots on respective surfaces which face towards said front body when laid thereover and which are adjacent respective distal ends of said flaps and respective base ends laid upon the laterally opposite side portions of the waist zone of said front body;

at each side of said diaper a side portion of said waist zone of said front body is bonded to a side portion of said waist zone of said rear body and one said base end of a respective fastening flap along a bond line;

cutting lines are provided laterally inwardly and adjacent said respective bond lines so that said front body may be torn off along these cutting lines from said rear body; and

each of said bond lines has a resistance of 1000 g/inch or higher to separation occurring between said front and rear bodies.

2. A disposable diaper according to claim 1, wherein said bond lines are formed by welding.

3. A disposable diaper according to claim 1 or 2, wherein said cutting lines are formed by intermittent cuts or perforations.

4. A disposable diaper substantially as herein described with reference to Figs. 1 to 7 of the accompanying drawings.

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